the school buildings having been kindly lent by the governors for this purpose. The object of the Summer School is to provide theoretical and practical instruction in the methods of geography and to furnish opportunities for the discussion and elucidation of problems connected with the teaching of the subject. The course will consist of lectures, laboratory work, field work, and demonstrations. Lectures will begin on Morning morning, August 2, and the course will end on Saturday, August 21. Among the lecturers will be Prof. Kendall (professor of geology in the University of Leeds), Dr. A. Gilligan (lecturer in economic geology), Mr. C. B. Fawcett (lecturer in geography), Dr. W. G. Smith (lecturer in agricultural botany at the Edinburgh and East of Scotland Institute), and Mr. W. P. Welpton (lecturer in education and master of method in the University of Leeds). Applications for tickets should be made to the Secretary of the Yorkshire Summer School of Geography, The University, Leeds.

BEDFORD College for Women, a constituent college of the University of London, and the largest and oldest university college for women in England, has issued an appeal for funds. At the moment, when there is an overwhelming demand by women for higher education and training, the college must either refuse admission to highly suitable students and starve or close down certain departments, or it must enlarge its buildings and increase its endowments. Seven hundred students now crowd into buildings adapted for four hundred and fifty, with the result that in many cases classes have to be triplicated and classrooms and apparatus shared between different departments. A sum of 100,000*l.* is needed for additional lecture-rooms and laboratories. A second 100,000*l.* is required for endowment, notably for scholarships, the various departments of science, the department of social studies, and the training department. A third 100,000*l.* is badly needed for a hostel. An opportunity for acquiring an admirable site just outside Regent's Park has presented itself. Whether the college can take advantage of this must depend on the generosity of the public. It should, perhaps, be emphasised that, apart from such developments, the income of the college is by no means sufficient for its present needs in view of the enormously increased cost of maintenance and the necessity for raising all salaries. The work of universities in the past could never have been done had there not lived generous men and women who believed they could render no greater public service than by endowing colleges and thus furnishing opportunities for rich and poor to acquire sound learning. May we hope that a like generosity and a like belief exists to-day? The Queen's interest in the college is well known, and has taken the practical form of giving a donation. Subscriptions should be sent to Viscountess Elveden, hon. treasurer of the Bedford College Endowment and Extension Fund, Bedford College, Regent's Park, N.W.1.

Societies and Academies.

LONDON.

Royal Society, March 18.—Sir J. J. Thomson, president, in the chair.—W. B. **Brierley**: A form of *Botrytis cinerea* with colourless sclerotia. A form of *Botrytis cinerea* with colourless sclerotia is described. This was obtained by the isolation and growth of a colourless sclerotium, which was formed in a culture of a normal strain derived from a single spore. The primary origin of the change resulting in the albino form is located in the hyphal mother-cell from which the initial colourless sclerotium arose. Lotsy's dictum that "certainty of purity is a *conditio sine qua non* to obtain proof of the existence of mutation in living beings" is accepted, and it is shown that such a state is possibly not realisable in the fungi. It is suggested that somatic fusions resulting in a change of genotypic values are the mechanism whereby evolution in the fungi has taken place.—R. R. **Gates**: A preliminary account of the meiotic phenomena in the pollen mother-cells and tapetum of lettuce (*Lactuca sativa*). In a preliminary study of meiosis in the pollen development of lettuce, several points have appeared which have a general bearing on cytological conceptions and the problems of genetics. The exceptional condition has been found in lettuce, in which every intergrade occurs between pollen mother-cells and tapetal cells. Even synapsis has been observed in binucleate tapetal cells, which emphasises the physiological aspects of the synaptic contraction. The tapetal cells are peculiar in being often very much elongated and lying lengthwise of the anther. Ultimately they break down and form a plasmodium surrounding the pollen-grains. Cytomyxis also occurs, though rarely, during the stage of synapsis in the pollen mother-cells.

March 25.—Sir J. J. Thomson, president, in the chair.—A. R. **Forsyth**: Note on the central differential equation in the relativity theory of gravitation. The critical equation in Prof. Einstein's theory is—

$$\left(\frac{du}{d\phi}\right)^2 + u^2 = \frac{c^2-1}{\lambda^2} + 2\frac{m}{\lambda^2}u + 2mu^3,$$

so that

$$\left(\frac{du}{d\phi}\right)^2 = 2m\,(u-\alpha)\,(u-\beta)\,(u-\gamma),$$

where α, β, γ are proved to be real and positive for the known planetary bodies in the solar system, and are arranged so that $\alpha>\beta>\gamma$.

There is no need for initial approximation. The equation can be integrated exactly, in terms of elliptic functions. The integral is—

$$u=\gamma+(\beta-\gamma)\,\frac{1+cn\,\{(\phi-\varpi)/\rho\}}{1+dn\,\{(\phi-\varpi)/\rho\}}$$

where $\phi=\varpi$ at perihelion; the modulus of the elliptic functions is given by—

$$k^2=\frac{\beta-\gamma}{\alpha-\gamma} \text{ and } \rho=\{2m\,(\alpha-\gamma)\}^{-\frac{1}{2}}.$$

Further, the advance of the perihelion in one revolution is—

$$4\rho K-2\pi,$$

where K is the complete first elliptic integral with the modulus k. These expressions are accurate (and not approximate) in relation to the initial equation. For approximations in connection with the known members of the solar system, k^2 is small, so that K is slightly greater than $\frac{1}{2}\pi$, and ρ is slightly greater than unity. The advance of the perihelion is $2\pi.3m^2/\lambda^2$; and the value of u is—

$$\frac{m}{\lambda^2}\{1+e\cos(\phi-\varpi)+\frac{m^2}{\lambda^2}e^2\sin^2(\phi-\varpi) + 3\frac{m^2}{\lambda^2}e(\phi-\varpi)\sin(\phi-\omega)\}.$$

—R. D. **Oldham**: The frequency of earthquakes in Italy in the years 1896 to 1914. The paper is an attempt to discover whether there is any variation in the frequency of earthquakes which can be attributed to the stresses set up by the gravitational attraction of the sun and the moon. In addition to some small and more or less doubtful variations, there was found to be a very marked maximum frequency about the time of the new moon, when the declinations of the sun and moon were of the same sign and at the full

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when they were opposite, together with an equally marked minimum frequency at the full when the declinations were the same, and at the new when they were opposite. At the quarters the frequency is about average; at the times of minimum the frequency is about one-third, and at the maximum about five-thirds, of the average. The magnitude, no less than the fact that it is continuously recognisable throughout the record, shows that the variation is a real one, and it is difficult to find any other cause than the effect of the stresses set up by the gravitational attraction of the sun and the moon.—A. F. **Dufton**: A new apparatus for drawing conic curves. With the apparatus described in this paper the conic is drawn as the polar reciprocal of a circle. A four-bar linkage constrains a pen to trace the locus of the pole of a fixed straight line enveloping a circle upon paper pinned to a rotating drawing-board. The instrument draws conics with precision. It traces the curves at one sweep, and is applicable to all conics.—Capt. J. W. **Bispham**: An experimental determination of the distribution of the partial correlation coefficient in samples of 30. The distributions are described of the observed values of the partial and total correlations from 1000 samples of 30 each. The three attributes of the sampled (artificial) population are uncorrelated, so that observed values of the correlations are departures from the true value, which is zero in each case. The three groups of 1000 total correlations observed are shown to be nearly Gaussian in form, and to be in very close accord with the distributions predicted in general form by R. A. Fisher, and evaluated in detail in an important co-operative study described in *Biometrika*. The distribution of partial correlations is compared with the Gaussian, the Pearson Type II., and the theoretical distribution of *total* correlations referred to above. It is found to be closely fitted by the latter, and not to show significantly higher dispersion than is indicated by the usual expression for the standard deviation of total correlations, viz. $1-\rho^2/\sqrt{n-1}$. Some important practical bearings of the result are indicated.

PARIS.

Academy of Sciences, March 1.—M. Henri Deslandres in the chair.—G. **Humbert**: The number of classes of positive quadratic forms of Hermite, of given discriminant, in an imaginary quadratic body.—Em. **Bourquelot** and M. **Bridel**: A new glucoside capable of hydrolysis by emulsin, scabiosine. This glucoside was extracted from the root of *Scabiosa succisa* (devil's bit scabious). Details of its isolation and hydrolysis by dilute sulphuric acid and by emulsin are given.—A. **Rateau**: The flight altitude which corresponds to a minimum consumption of petrol per kilometre, and the calculation of the best propeller for a given aeroplane.—A. **Righi**: The experimental bases of the theory of relativity.—A. Mesnager was elected a member of the section of mechanics in succession to the late Marcel Deprez, and A. Fowler a correspondant for the section of astronomy in succession to the late Edmund Weiss.—N. E. **Nörlund**: The convergence of certain series.—A. **Rosenblatt**: A theorem of A. Liapounoff.—M. T. **Huber**: A rational theory of pugging in reinforced concrete, considered as thin plates.—Ch. **Fremont**: The resistance of steels to cutting by tools. It is well known that steels possessing the same resistance to fracture by tension may differ greatly in the ease with which they can be cut by tools. Instead of the usual calculation, maximum load divided by initial cross-section, the author proposes the term "final resistance," obtained by dividing the maximum load by the actual cross-section of the broken test piece.—J. **Guyot** and L. J. **Simon**: The combustion of methyl esters with a mixture of sulphuric and chromic acids. Analytical figures are given for the wet combustion of sixteen methyl compounds of different types, and the carbon dioxide produced is shown to be practically theoretical.—A. **Mailhe** and F. **de Godon**: The preparation of fatty acids by the catalytic oxidation of the primary alcohols. With reduced copper as catalyst, and at temperatures between 260° C. and 270° C., the primary alcohols with air give substantial yields of the corresponding acids. Aldehydes are always produced at the same time, and in some cases more aldehyde than acid is produced.—C. **Schlumberger**: Attempts at the electrical prospecting of the subsoil.—Mme. Z. **Gruzewska**: Contribution to the study of laminarine from *Laminaria flexicaulis*. Laminarine cannot be considered as belonging to the dextrin group, having regard to its lævorotatory power and its resistance to the action of acids and alkalis. Its digestibility by the plant diastases shows it to be a reserve material in the marine algæ.—A. **Sartory**: A new fungus of the genus Aspergillus isolated from a case of onychomycosis.—H. **Piéron**: The variation of energy as a function of the time of stimulation for foveal vision.—A. **Vernes** and R. **Douris**: The action of certain precipitates on the solution of the red blood corpuscles.—R. **Anthony**: The exorchidia of Mesoplodon and the re-ascent of the testicles in the course of the phylogeny of the Cetaceans.—J. L. **Lichtenstein**: The parasitism of *Aphiochaeta* (*Phora*) *fasciata*.—E. F. **Galiano**: Some histological details of the arterial heart of *Sepia officinalis*.—G. **Riquoir**: Colloidal complexes and sera. A preliminary injection of a colloid, followed after an interval by an injection of a curative serum, may produce beneficial effects in cases where the serum injection alone has proved to be without effect. Several examples are detailed.—A. **Trillat**: The influence of the variation of the barometric pressure on the microbial droplets in suspension in the atmosphere.

Books Received.

A Geographical Bibliography of British Ornithology. By W. H. Mullens, H. Kirke Swann, and Rev. F. C. R. Jourdain. Part iii. Pp. 193–288. (London: Witherby and Co.) 6*s*. net.

Aristotle. By Dr. A. E. Taylor. Revised edition. Pp. 126. (London and Edinburgh: T. C. and E. C. Jack, Ltd.) 1*s*. 3*d*. net.

Wireless Telegraphy and Telephony. By H. M. Dowsett. Pp xxxi+331. (London: The Wireless Press, Ltd.) 9*s*.

Wireless Transmission of Photographs. By M. J. Martin. Second edition. Pp. xv+143. (London: The Wireless Press, Ltd.) 5*s*.

Selected Studies in Elementary Physics. By E. Blake. Pp. viii+176. (London: The Wireless Press, Ltd.) 5*s*.

Volumetric Analysis. By J. B. Coppock. Revised and enlarged edition. Pp. 100. (London: Sir I. Pitman and Sons, Ltd.) 3*s*. 6*d*. net.

A Map of the World (on Mercator's Projection), having Special Reference to Forest Regions and the Geographical Distribution of Timber Trees. Prepared by J. H. Davies. (Edinburgh: W. and A. K. Johnston, Ltd.; London: Macmillan and Co., Ltd.) 8*s*. net.

A Foundation Course in Chemistry. By J. W. Dodgson and J. A. Murray. Second edition. Pp. xii+240+Answers. (London: Hodder and Stoughton, Ltd.) 6*s*. 6*d*. net.

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